The Fit between Students' Lesson Perceptions and Desires:

Relations with Student Characteristics and the Importance of Motivation

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Abstract

Background

The fit between students' perceptions of a learning environment and their desires about its design influences students' learning behaviour and by consequence the effectiveness of education. Therefore, the students' perspective deserves a more prominent place in the educational design process. Having an adequate picture of the fit between students' perceptions and desires is needed for teachers/educational designers to account for students' perspectives while designing education. As perceptions-desires fit is likely to differ between students, establishing correlates to it would provide valuable information. Students' perceptions are known to relate to several student characteristics; This study extends our understanding to its relations with perceptions-desires fit.

Purpose

This study aims to investigate the degree to which students' perceptions of lessons fit with their desires about different aspects of modern education. Additionally, it is aimed to determine the most prominent relationships between perceptions-desires fit and learning-related student characteristics.

Sample

The sample consisted of 1146 tenth grade high school students (mean age = 16 years) from five secondary schools in the Netherlands. As data collection took place during normal school hours the response rate was 100 %, comprising all students that were at school on the day of data collection.

Design and methods

To measure students' perceptions of the lessons and their desires about its instructional design students completed the Inventory of Perceived Study Environment Extended, being composed of eight scales about central characteristics of modern education. The

Inventory of Learning Styles was administered to measure learning-related student characteristics: Cognitive processing strategies, regulation strategies, motivational orientations, conceptions about learning, and affective processing strategies. To answer the research questions, paired *t*-tests and multiple regression analyses were conducted.

Results

Findings showed low perceptions-desires fit on fascinating contents, clarity of goals, and student autonomy. Students desired these characteristics being more represented in their lessons than they actually perceived them. Perceptions-desires fit was predominantly related to students' motivation and affective state: A personally interested motivational orientation related to better perceptions-desires fit, while motivational/concentration problems related to worse fit. These relations did not give indications about causality, but based on the literature a bidirectional relation is supposed.

Conclusion

This study shows that students' perceptions-desires fit gives clear indications for which aspects of lessons could be improved. As students consider almost all characteristics of modern education as desirable, meeting student wishes could contribute to more effective education. Additionally, the perceptions-desires fit relates to students' motivation and affective strategies. Improving education by accounting for the fit between students' perceptions and desires of education is likely to improve motivation as well as having a significant on the quality of education.

Keywords: Student experience, instructional design, alignment, motivation, user satisfaction

The Fit between Students' Lesson Perceptions and Desires:

Relations with Student Characteristics and the Importance of Motivation

Educational designers and teachers focus lots of efforts on designing instructional methods that provide students optimal conditions to learn. However, only their own knowledge and professional experiences are incorporated. Students are usually not involved in the educational design process (Cook-Sather, 2001), and designers and teachers have only limited insight in students' views on it (e.g., Kershner & Pointon, 2000). Instruction that is meant to be appropriate for students will be most effective if it is actually perceived by them as appropriate (Elen & Lowyck, 1999; Norman, 1986, 1988).Therefore, the main goal of the current study is to investigate the degree to which student perceptions of their instruction/lessons fit with their desires. This question deserves a more prominent place in the educational design process, because it is known that students' perceptions of instruction are very important for its effectiveness in terms of learning results (Doyle, 1977; Elen & Lowyck, 1999; Entwistle & Tait, 1990).

The first goal of this study is to investigate the degree of fit between students' perceptions and their desires (i.e., perceptions-desires fit) with respect to different characteristics of modern education, like the degree of student autonomy or the clarity of learning goals. Perceptions-desires fit, however, is an individual adjustment of the degree to which instruction fits one's needs and desires and this is likely to vary depending on students' characteristics (Eccles et al., 1993). Therefore, the second goal of this study is to learn more about relationships between perceptions-desires fit and student characteristics .

Educational Design and the Student's Perspective

According to the Combination-Of-Perspective model, information on how education is experienced by students should provide teachers and educational designers with feedback on

their work (Könings, Brand-Gruwel, & van Merriënboer, 2005). It provides teachers with input they can use to optimise their lessons and should ultimately help designers to incorporate this user (i.e., student) knowledge in their instructional designs. Markopoulos and Bekker (2003) even argued that an educational design should be driven by knowledge of the students, and that they should not only be involved as users, testers, and informants but as real design partners. It is of great value to explicitly determine how students perceive their education, especially, because student interpretations of the environment are not easily predictable for teachers and designers (Donaldson, 1978; Kershner & Pointon, 2000).

Although the importance of students' views is acknowledged (Burke, 2007), it is not yet incorporated in designing daily teaching practices (Cook-Sather, 2001). It is important to change this way of working, since research pointed out that not the characteristics of the instruction itself, but foremost students' perceptions of the instruction determine the nature and quality of their learning processes (Elen & Lowyck, 1999; Entwistle & Tait, 1990). Additionally, students use only those instructional elements that are in congruence with their learning preferences and fit well in their habitual way of learning (Vermetten, Vermunt, & Lodewijks, 2002). By consequence, more knowledge about the fit between students' perceptions and desires about instruction is of utmost importance. If there is a bad fit, students are likely to choose their own ways of learning, instead of behaving in agreement with the instructional design (ibid). Additionally, learning arrangements that do not fit students' needs are likely to have negative consequences on their motivation and engagement (Eccles et al., 1993), problems such as poor grades, misconduct, and poor mental health (Roeser, Eccles, & Sameroff, 2000) and it may end in students' disengagement and drop-out of school (Hijzen, Boekaerts, & Vedder, 2007; Smyth & Fasoli, 2007). Thus, both the students and the educational setting would benefit from an optimal fit between students' needs or desires and

their perceptions of the offered instruction. As an implication, students' criticisms and point of dissatisfaction (i.e., bad perceptions-desires fit) have to be taken very seriously.

Taken together, exploring the perceptions-desires fit as experienced by the students could offer insight and feedback about what is really going on in the class. Therefore, our first research question focuses on the degree to which high school students' perceptions of their (innovative) learning environment match with their desires about the instructional design.

Individual Differences between Students

When listening to students and investigating their perceptions, desires, and the fit between both, it should be noticed that their reports are personal and varied, even if they follow the same lessons. This variation might be due to students' varying needs and expectations of an environment, and dissimilar values and norms used by the students to reflect on it (Levy, den Brok, Wubbels, & Brekelmans, 2003). Another source of variation in student reports is provided by the result of an interaction between internal, learning-related characteristics (metacognitive instructional knowledge) and external, environment-related characteristics of the education as it is offered to students (Luyten, Lowyck, & Tuerlinckx, 2001). Relevant internal learning-related variables described in the literature include (a) cognitive processing strategies, (b) regulation strategies, (c) motivational orientations, (d) conceptions about learning, and (e) affective processing strategies (Vermunt & Vermetten, 2004). For each of these learning-related student characteristics there is evidence for a relation with student perceptions and/or desires. So, we hypothesise to also find relations between these student characteristics and perceptions-desires fit.

First, students differ in their habits for using different kinds of *cognitive processing strategies* (i.e., cognitive activities that students use to process learning contents), which are likely to be related to the perceptions of the learning environment (e.g., Entwisle & Ramsden, 1983; Entwistle & Tait, 1990; Trigwell & Prosser, 1991). Students who use deep processing

strategies perceive the learning environment as more personalised, more strongly encouraging active learning, and requiring more use of inquiry skills than students using stepwise processing strategies (Dart, 1999). Cognitive processing strategies are also related to desires about the learning environment: Students prefer an environment that supports their habitual way of learning (Entwistle & Tait, 1990).

Second, the use of *regulation strategies* varies among students. In the way students regulate and steer their own learning process, they can either regulate and manage their own learning process themselves, or rely heavily on the teacher or the environment for regulation, or even experience a complete lack of regulation during learning (Vermunt, 1998). Students who use self-regulatory strategies, actively manage their environment, adapt to it, and change the environment to better fit their desires and needs (Pintrich & Schauben, 1992). These regulation strategies might lead to a better fit between students' perceptions and desires in a learning environment.

Third, students' *motivational orientations* (i.e., personal goals or motives students have for learning and going to school) seem relevant: Changes in motivation can be explained by changing experiences of the lessons during a school year (Bong, 2005). Learning arrangements which badly fit students' needs (i.e., bad perceptions-desires fit) are likely to have negative consequences on students' motivation and engagement (e.g., Eccles et al., 1993), which in turns leads to inferior school performance (Schwinger, Steinmayr & Spinath, 2009; Steinmayr & Spinath, 2009). When students experience their educational needs (e.g., self-determination) as being neglected or frustrated they become even vulnerable for dropping out of school (Hardre & Reeve, 2003), which can be considered as the most serious loss of motivation for learning.

Fourth, students' *conceptions about learning* and what constitutes learning relate to their perceptions of a learning environment (e.g., Dart et al., 2000). Conceptions influence

perceptions as they can be seen as lenses through which people perceive and interpret the world (Pratt, 1992). Tsai (2000) reported relationships between conceptions of knowledge and students' perceptions of instruction, as well as their preferences about how to learn: Students with constructivist oriented beliefs pref environments in which knowledge construction has a prominent place. These students also perceive the environment differently, as they better understand the complexity of the offered environment and the learning opportunities they have in it (Campbell et al., 2001). Moreover, students' conceptions or epistemological beliefs indirectly influence learning approaches, as they are clearly related to the perceptions of the environment (Ozkal et al., 2009). Since both perceptions and desires relate to conceptions about learning, perceptions-desires fit may also relate to students' conceptions.

Fifth and last, *affective processing strategies* might also be related to students' perspectives on learning (Vermunt & Vermetten, 2004). Affect refers to emotions and affective states, which may influence students' learning processes. Students' perceptions of teaching are related to the affective value of school: Positive perceptions contribute to liking school and enthusiasm to participate in learning activities (Ireson & Hallam, 2005). Enthusiasm and positivism about school are only possible if the perceptions match with students' desires and, thus, a relation between affective processing strategies and perceptions-desires fit is hypothesised in our study.

In sum, various studies have shown that different learning-related student characteristics are related in some way to student perceptions and/or desires. However, they have all been studied separately, not in coherence with each other and the relations with perceptions-desires fit is underexposed. The current study investigates which learning-related student characteristics are related most strongly to their perceptions-desires fit. Based on the literature, it can be hypothesized that motivational orientation will be strongly related to perceptions-desires fit (as these effects are described already fairly detailed), but there are

limited indications to define a hierarchy of importance of variables beforehand. For getting a clearer view we will include all mentioned learning-related student characteristics in one study.

Taken together, the current study answers two research questions: (1) To what extent do students' perceptions of their learning environment fit with their desires about different aspects of modern education? As modern education is based on principles of cognitive psychology and constructivism, the focus will be on students' perceptions-desires fit with respect to several characteristics of modern education; (2) How does the degree of fit between students' perceptions and desires relate to learning-related characteristics, in particular, cognitive processing strategies, regulation strategies, motivational orientations, conceptions about learning, and affective processing strategies?

Method

Participants

The sample consisted of 1146 students of five schools for secondary education in the Netherlands. All 10^{th} graders (mean age = 16.32 years, *SD* = .60) of these schools participated in the study. They were following either senior general secondary education (47.2 %) or pre-university education (52.8 %).

Materials

The learning environment.

The context of this study is a nationwide innovation in Dutch secondary education called the Second Phase (Ministerie van Onderwijs, Cultuur, en Wetenschap [Dutch Ministry of Education, Culture, and Science], n.d.; Stuurgroep Profiel Tweede Fase Voortgezet Onderwijs [Steering Committee for the Profile for the Second Stage of Secondary Education], 1995). The Second Phase requires students to independently acquire skills and knowledge to better

prepare them for higher professional education and university. Students learn in a self-directed way with ample opportunities for collaborative learning. There is more room for individual differences than in the traditional educational system, and teachers have to take these differences into account. The teacher's role is more like that of a coach and less like that of an instructor, which creates more opportunities for interaction between students and the teacher. The learning process is not only directed to knowledge acquisition but also to the selection and processing of the vast amounts of information available today. In addition, the coherence between knowledge and skills and the application of knowledge in subject-matter domains are emphasized. To summarise, the instructional design of the Second Phase includes all characteristics of a powerful learning environment.

Inventory of Perceived Study Environment Extended (IPSEE).

The IPSEE (Könings, Brand-Gruwel, Van Merriënboer, & Broers, 2008) measures students' perceptions of a particular learning environment and their desires about its design. The perceptions-desires fit pertains to the discrepancy between perception scores and desire scores. The IPSEE consists of 67 items. Thirty-one of these items originate from the Inventory of Perceived Study Environment (Wierstra, Kanselaar, van der Linden, & Lodewijks, 1999; Picarelli, Slaats, Bouhuijs, & Vermunt, 2006). To measure the characteristics of powerful learning environments as described by Könings, Brand-Gruwel, and Van Merriënboer (2005) more completely another 36 items were constructed.

The items of the IPSEE cover eight scales (see Table 1) that are considered as central characteristics of modern education. The scale *fascinating contents* contains items about the extent to which the learning contents are interesting, challenging, and personally relevant for the students. The scale *productive learning* indicates little emphasis on sole reproduction of learning contents but rather on an active process of making sense of the subject matter. The scale *integration* concerns integration of newly acquired knowledge with prior knowledge, of

different subject matter domains, and of knowledge and skills The scale *student autonomy* measures attention paid to students' self-directedness with regard to content of learning, way of learning, and planning of time. The scale *interaction* incorporates collaboration with peers and interaction with the teacher. The scale *differentiation* inquires opportunities for students to choose and perform different learning tasks, solve problems in different ways, and use different learning materials. The scale *clarity of goals* includes items about the clarity of instructional goals and task demands. The scale *personalization* measures the availability of support from teachers.

*** TABLE 1 NEAR HERE ***

A sample item of each scale is included in Table 1. All items contain a statement about one of the characteristics of the learning environment and two questions, one related to the perceptions of a characteristic and one related to its desirability, as in the following example:

Students can decide for themselves how they wish to learn during the course.

a) This happens.

b) I would like this to happen.

The questions are answered on a 6-point scale, ranging from totally disagree (score = 1) to totally agree (score = 6). Scores on question A indicate students' perceptions and scores on question B indicate students' desires. The discrepancy (i.e., absolute difference) between the scores on A and B refers to the perceptions-desires fit with respect to the education offered (see also, Wierstra, Kanselaar, van der Linden, & Lodewijks, 1999). Discrepancy scores range from 0, indicating a good perceptions-desires fit, to 5 what indicates an inferior perceptions-desires fit. So, higher discrepancy scores refer to low fit. For reaching conceptual congruence between the numerical scores and the meaning of the level of fit, discrepancy scores are recoded so that a score of 0 indicates lowest fit (i.e., minimum) and the score of 5 refers to the highest fit (i.e., maximum). Fit scores are computed as 5 - discrepancy score.

Internal consistencies of the IPSEE scales are presented in Table 1. All Cronbach's alpha coefficients were above .70, except coefficients for the scale *differentiation*, which were above .65. They were all acceptable.

Inventory of Learning Styles for Secondary Education (ILS-SE).

This questionnaire (Vermunt, 1992; Vermunt, Bouhuijs, and Picarelli, 2003) measures learning-related characteristics on the basis of the usual way of learning of secondary school students. The ILS-SE consists of 100 items divided in five clusters: (a) processing strategies (cognitive activities that students use to process learning contents), (b) regulation strategies (the way students regulate their own learning process), (c) motivational orientations (personal goals or motives students have for learning and going to school), (d) conceptions of learning (mental models about learning), and (e) affective processing strategies (emotional aspects of learning). Each of the five clusters contains several scales, which are presented in Table 2.

*** TABLE 2 NEAR HERE ***

For each item, students rate the degree to which that particular statement corresponds to their own learning on a 5-point scale. Information about internal consistencies of the scales is included in Table 2; all Cronbach's alpha coefficients were acceptable. For four scales the coefficients were above .60; for the other scales the coefficients were above .70.

Procedure

The participants filled out the IPSEE and the ILS-SE during normal school hours. Before completing the questionnaires, students were instructed about the goal and the contents of the questionnaires and about the scoring method. The IPSEE took between 30 and 40 minutes to complete; the ILS-SE took between 20 and 30 minutes to complete.

Data Analysis

Paired-samples *t*-tests were used to test whether discrepancies between perceptions and desires – indicating perceptions-desires fit – were significant. Multiple regression

analyses were conducted to investigate relations between perceptions-desires fit scores and learning-related student characteristics. In the following section only results are reported which are significant at a level of $p < .01$.

Results

Perceptions-Desires Fit, Perceptions, and Desires

Figure 1 presents the means of the perception and desire scores of the different scales of the IPSEE. By looking at the discrepancy between the perception bar and the desire bar, the perceptions-desires fit can be deduced.

*** FIGURE 1 NEAR HERE ***

The more both scores differ, the poorer the perceptions-desires fit (see, e.g., fascinating contents). The more both scores match, the better the perceptions-desires fit (see, e.g., integration). Although the size of the discrepancy differs among scales, paired *t* tests showed that for all scales perception scores differed significantly from desire scores. Effect sizes were large (η^2 between .37 and .76) for all but one scale. There was only a small effect on the scale differentiation ($\eta^2 = .01$). Perception scores were always lower than desire scores ($p < .01$), indicating that students prefer a more powerful environment than they actually perceive. Table 3 presents the descriptive statistics of the perceptions-desires fit scores, together with the perception and desire scores. It can be seen from the Table that perceptions-desires fit was worst for fascinating contents, the clarity of learning goals, and student autonomy.

*** TABLE 3 NEAR HERE ***

Furthermore, one-sample *t*-tests showed that on four of eight scales perception scores were significantly higher than the neutral score of 3.5 ($p < .01$), indicating that students perceived these characteristics of PLEs to be present in their actual learning environment: Integration, interaction, clarity of goals, and personalisation as higher than neutral. However,

perception scores were lower than 3.5 on half of the measured aspects of the environment: Fascinating contents, productive learning, student autonomy, and differentiation. Analyses on the desire scores showed that on seven of the eight scales desire scores were significantly higher than 3.5 ($p < .01$), which means that students clearly preferred most of the characteristics of PLEs. As an exception, the desire about differentiation was significantly lower than the neutral score ($p < .01$).

Perceptions-Desires Fit Scores and Learning-Related Student Characteristics

Table 4 presents the results of the multiple regression analyses investigating the relations between perceptions-desires fit scores and learning-related characteristics, separately per IPSEE scale. Several student characteristics were frequently related to perceptions-desires fit (i.e., on more than half of the IPSEE scales). These student characteristics will be described in more detail.

*** TABLE 4 NEAR HERE ***

Perceptions-desires fit scores were negatively related to displaying motivation/concentration problems. The more motivation/concentration problems were reported by students, the worse their perceptions-desires fit scores for the scales fascinating contents, student autonomy, productive learning, interaction, integration, and differentiation. In contrast, a personally interested motivational orientation was positively related to better perceptions-desires fit on fascinating contents, clarity of goals, student autonomy, productive learning, personalisation, and differentiation.

Strikingly, perceptions-desires fit related most frequently to a motivational and an affective subscale: A personally interested motivational orientation contributes to better perceptions-desires fit, whereas motivation/concentration problems contribute to inferior perceptions-desires fit. Since perceptions-desires fit is based on the discrepancy between perceptions and desires, the lower perceptions-desires fit scores of students with motivational

and concentration problems could be due to lower perception scores, higher desire scores, or a combination of both. Likewise, personally interested students could have better fit scores because of higher perceptions, more moderate desires, or a combination of both. Therefore, we conducted some extra explorative (multiple regression) analyses on the relations between perception scores and learning-related student characteristics, and between the desire scores and students' characteristics.

Table 5 presents the results on the relations between perceptions and learning-related characteristics. Results on relations between desire scores and learning-related characteristics are presented in Table 6. The variables of interest are printed in **bold** (personally interested) or underlined (motivation/concentration problems). It turned out that on the scales with positive relations between perceptions-desires fit scores and personal interest (see Table 4), also positive relations were found between perception scores and personal interest (for fascinating contents, student autonomy, clarity of goals, and personalisation; see Table 5), but not for desire scores (Table 6). These findings indicate that higher perceptions-desires fit scores of personally interested students are likely to originate from their more positive perceptions of the environment.

*** TABLES 5 AND 6 NEAR HERE ***

On the scales with negative relations between perceptions-desires fit and motivation/concentration problems (see Table 4), negative relations with perception scores were found on five scales (for fascinating contents, productive learning, integration, interaction, and student autonomy; see Table 5) and a positive relations to desire scores on one scale (i.e., student autonomy; Table 6). On the vast majority of the scales, however, lower perceptions-desires fit scores of students with motivation/concentration problems seem to be due to lower perception scores, rather than to higher desire scores.

Discussion and Conclusions

This study aimed to provide insight in students' perceptions-desires fit with respect to their learning environment. For the first research question – to what extent do students' perceptions of their learning environment fit with their desires – the results show that students are least satisfied with the degree to which contents were fascinating for them, the clarity of goals, and the offered opportunities for student autonomy. Students clearly prefer all studied aspects of modern education, which is a very positive outcome as it indicates congruence between the aims of educational designers and students. The only exception is differentiation, which is not a popular characteristic of education for students.

However, students do not perceive all those aspects as being present in their education as we found that they deny to see, for example, lots of room for student autonomy . This finding could be due to the fact that students do not always have an accurate perception of teachers' intentions in education. For instance, a teacher might have the intention to be clear about learning goals, but if students do not pick up relevant signals of the teacher this does not have the intended effects (Broekkamp, 2003). Another possible explanation is that the educational design of the lessons is not yet as modern and innovative as it could be (Könings, Brand-Gruwel, & van Merriënboer, 2007a). Teachers experience practical problems that make it difficult to use new instructional methods or their persistent approaches to teaching may hinder a complete implementation of innovations (ibid).

The second research question focused on how perceptions-desires fit relates to learning-related student characteristics. The results show that motivational and affective subscales relate most clearly to perceptions-desires fit: Learning because of personal interest relates to a high perceptions-desires fit, whereas reporting motivation/concentration problems is strongly linked to a low perceptions-desires fit.. Although earlier research has also shown

relations with the other learning-related student characteristics, motivation and affective strategies appeared to be the most important variables in relation to perceptions-desires fit.

The found relations between variables, however, do not allow for any conclusions about the causal direction of found effects. Thus, do students become frustrated and loose motivation because of the education they follow? Or are they unhappy and do they attribute their negative feelings to school and the lessons? In daily life, a popular explanation is that because of puberty, many students do not value school because other things are more important for them. However, Roeser, Eccles, and Sameroff (2000) clearly distinguish between students for whom a low valuing of school is a marker for complex problems (e.g., poor motivation to learn, poor mental health, poor grades, affiliation with negative peers), and students who are just bored with their schooling. Other studies (Eccles et al., 1993) have also shown negative motivational consequences when the environment does not fit well to the developmental needs and does not foster enough developmental growth. In a longitudinal study, Hardre and Reeve (2003) found that experiences in the classroom predict levels of motivation and students' intentions to persist or drop-out, indicating a causal relation from perceptions-desires fit to motivation for learning.

Concluding, there is a genuine possibility that - at least part of - the students report motivation/concentration problems or low personal interest in learning because of characteristics of their current learning environment. This underlines the claim that education could be further improved by taking a closer look at students' perceptions-desires fit. Because students prefer lessons that incorporate the characteristics of PLEs more than currently perceived, their perspectives are worth to get a more prominent place in the design process of educational innovations.

A first theoretical implication is that motivational and affective student characteristics have to be considered as most important correlates to perceptions-desires fit. Although other

characteristics may be important as well, in this study personally interested motivational orientation and motivation/concentration problems were identified as most closely related to perceptions-desires fit (in order, in a positive and a negative direction). Furthermore, students' perceptions-desires fit was introduced as an dependent variable in our study. Wierstra, Kanselaar, van der Linden, and Lodewijks (1999) already described dissatisfaction as the discrepancy between perceptions and desires, but it was not used before as an dependent variable. The current study shows that it is an important and informative additional construct when investigating students' perspectives on education.

A practical implication of this study is that, when listening to student experiences and suggestions for improving lessons (see e.g. Könings, van Zundert, Brand-Gruwel, & van Merriënboer, 2007b), it is important to include a representative sample of the student population in such a discussion. Both satisfied *and* dissatisfied students have to be consulted. Students with a low perceptions-desires fit should certainly not be excluded from such a discourse because their criticisms are unwelcome. Probably, these students will benefit most from the opportunity to contribute to the (re)design of their education.

A limitation of the current study is that students are asked to report on their perceptions-desires fit with respect to the lessons in their current school year. This provides only general measures, independent of specific subject matter or teacher. Investigating the perceptions-desires fit at a micro-level could be the focus of future research. Additionally, future investigations should give more clarity about the causal relations between perceptions-desires fit and motivational and affective variables. It would be highly interesting to examine whether raising students' perceptions-desires fit by educational redesign could improve motivation and decrease motivation/concentration problems. Another interesting point for future research starts from our finding of students' resistance for differentiation. As

differentiating education to adapt to individual needs seems crucial for optimising the perceptions-desires fit underlying causes have to be investigated.

To conclude, this study showed students' perceptions-desires fit can give clear indications for which aspects of lessons could be improved. As students consider almost all characteristics of modern education as desirable, meeting student wishes could contribute to more effective education. Additionally, the perceptions-desires fit showed to be clearly related to students' motivation and affective strategies. This study does not allow conclusions about the causal direction, but the available literature seems to indicate bidirectional relations. Improving education by accounting for the fit between students' perceptions and desires about education is thus likely to improve motivation besides a feasible effect on the quality of education. This supports our claim that teachers and designers need to take students' perceptions-desires fit into account more seriously.

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Table 1

Internal consistencies and sample items for all scales of the IPSEE

Scale	Sample item	Number of items	Cronbach's alpha coefficient		
			Perception	Desire	Perceptions-desires fit
Fascinating contents	The assignments students have to make clearly relate to topics in everyday life.	9	.85	.77	.81
Productive learning	The teacher expects the students to get the meaning of the concepts into their mind one by one	5	.83	.81	.84
Integration	The teacher expects students to connect the various aspects of the subject matter on their own.	11	.81	.78	.79
Student autonomy	I am given the opportunity to pursue my particular interest in the course.	15	.85	.84	.88
Interaction	During classes, the subject matter is discussed with the	11	.73	.73	.71

	students.				
Differentiation	All students solve their assignments in the same way.	6	.66	.72	.67
Clarity of goals	Students are informed what to expect of the examination.	4	.81	.72	.79
Personalisation	Students can always rely on the teacher for help.	6	.80	.70	.77

Table 2

Descriptions and Internal Consistencies of the Scales of the ILS-SE

Cluster	Scale	Description of scale	Number of items	Cronbach's alpha
Processing strategies	Deep processing	Relating and structuring knowledge elements and critical processing of information	12	.84
	Stepwise processing	Memorising, rehearsing, studying information in detail	8	.80
Regulation strategies	Self-regulation	Regulation of the own learning process through activities like planning, monitoring, reflecting and own initiatives with respect to learning contents	8	.71
	External regulation	Learning to be regulated by external sources, like books or teacher	6	.66
	Lack of regulation	Difficulties with regulating learning and processing contents effectively	4	.71
Motivational orientations	Personally interested	Learning because of interest in the learning contents and the desire to develop oneself	4	.67
	Certificate-oriented	Learning for passing tests, gaining high grades, and obtaining certificates	5	.63
	Vocation-oriented	Learning for future study and professions	4	.77

	Ambivalent	Doubtful, uncertain attitude toward own capacities and chosen courses	5	.74
Conceptions of learning	Construction and use of knowledge	Learning as constructing one's own knowledge and using it by means of concretising and applying	8	.81
	Intake of knowledge	Learning as taking in information, provided by education and memorising/reproducing it	4	.64
	Cooperative learning	Preferring learning in cooperation with fellow students	3	.76
	Stimulating education	Learning as a process continuously driven by teachers and/or textbooks	5	.79
Affective processing strategies	Motivation/concentration problems	Problems with staying concentrated and motivated during learning, easily being distracted and sometimes showing postponing-behaviour	8	.86
	Fear of failure	Experiencing stress during learning, especially in testing situations and having a negative self-image	8	.87
	Keeping a good state of mind	Having a positive idea about own capacities, being self-confident and performing activities to stay motivated and concentrated	8	.71

Table 3

Means and Standard Deviations of Perceptions-Desires Fit Scores (Ordered from Low to High), Perception and Desire Scores

	Perceptions-desires fit		Perception		Desire	
	M	*SD*	*M*	*SD*	*M*	*SD*
Fascinating contents	3.23	.97	3.10	.85	4.87	.63
Clarity of goals	3.47	1.04	3.82	.96	5.32	.55
Student autonomy	3.67	.89	3.29	.71	4.56	.59
Productive learning	3.77	.99	2.87	1.00	3.85	.99
Personalisation	4.93	.85	3.95	.86	4.99	.59
Interaction	4.10	.64	3.70	.65	4.56	.58
Integration	4.10	.72	3.74	.69	4.60	.55
Differentiation	4.36	.65	3.10	.76	3.22	.85

Note. Perceptions-desires fit = 5 – discrepancy $_{\text{perception-desire}}$

Table 4

Significant Regression Weights (p < .01) of Variables Predicting Perceptions-Desires Fit

Dependent variable	R^2	*Independent variable(s)*	*B*	*SE B*	*β*
Fascinating contents	.15	Motivation/concentration problems	-.28	.03	-.24
		Personally interested	.28	.04	.20
		Lack of regulation	-.09	.03	-.08
Productive learning	.09	Motivation/concentration problems	-.20	.04	-.17
		Personally interested	.25	.04	.18
		Keeping a good state of mind	-.13	.04	-.09
Integration	.04	Ambivalent	-.11	.03	-.11
		Deep processing	-.13	.04	-.11
		Problems with motivation & concentration	-.07	.03	-.09
Student autonomy	.06	Problems with motivation & concentration	-.17	.03	-.16
		Personally interested	.16	.04	.12
		Certificate-oriented	-.21	.05	-.13
		Intake of knowledge	.13	.04	.11
Interaction	.07	Problems with motivation & concentration	-.11	.02	-.14
		Cooperative learning	-.08	.02	-.11
		Lack of regulation	-.08	.02	-.11
Differentiation	.05	Problems with motivation & concentration	-.10	.02	-.13
		Deep processing	-.16	.03	-.16
		Personally interested	.08	.03	.08
Clarity of goals	.09	Personally interested	.26	.04	.17
		Lack of regulation	-.21	.04	-.17

Personalisation	.06	Lack of regulation	-.18	.03	-.18
		Personally interested	.14	.04	.12

Table 5

Significant Regression Weights (p < .01) of Variables Predicting Perceptions

Dependent variable	R^2	*Independent variable(s)*	*B*	*SE B*	*β*
Fascinating contents	.30	**Personally interested**	.34	.04	.28
		Problems with motivation & concentration	-.25	.03	-.25
		Construction and use of knowledge	.29	.04	.22
Productive learning	.15	Stepwise processing	-.27	.04	-.19
		Problems with motivation & concentration	-.17	.04	-.14
Integration	.12	Construction and use of knowledge	.20	.04	.18
		Vocation-oriented	.13	.03	.14
		Problems with motivation & concentration	-.09	.02	-.11
		Personally interested	.09	.03	.10
		External regulation	.10	.03	.09
		Vocation-oriented	.08	.03	.09
Student autonomy	.06	**Personally interested**	.12	.03	.12
		Problems with motivation & concentration	-.08	.03	-.10
		Construction and use of knowledge	.11	.04	.10
Interaction	.19	Cooperative learning	.21	.02	.28
		Problems with motivation & concentration	-.12	.02	-.16
Differentiation	.04	External regulation	-.12	.04	-.10
Clarity of goals	.12	Ambivalent	-.16	.04	-.13
		Personally interested	.20	.04	.15
		Lack of regulation	-.14	.04	-.12
		External regulation	.14	.05	.09

Personalisation	.11	**Personally interested**	.13	.04	.11
		External regulation	.18	.04	.13
		Lack of regulation	-.13	.03	-.13
		Problems with motivation & concentration	-.08	.03	-.08
		Construction and use of knowledge	.12	.04	.09

Table 6

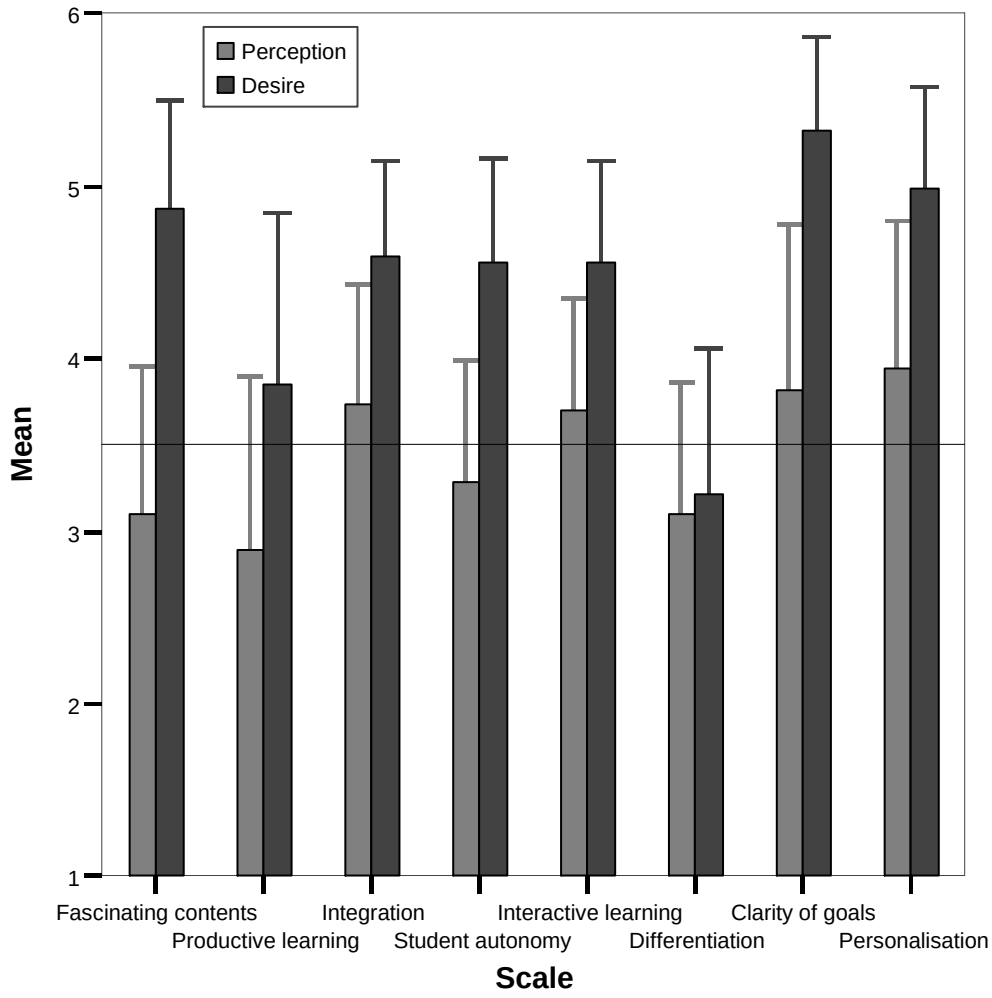
Significant Regression Weights (p < .01) of Variables Predicting Desires

Dependent variable	R^2	*Independent variable(s)*	*B*	*SE B*	*β*
Fascinating contents	.23	Construction and use of knowledge	.27	.03	.27
		Deep processing	.14	.03	.14
		Certificate-oriented	.11	.02	.10
		Lack of regulation	.08	.02	.10
		Keeping a good state of mind	.08	.03	.08
Productive learning	.21	Stepwise processing	-.58	.04	-.41
		Intake of knowledge	-.21	.04	-.16
		External regulation	.13	.05	.08
Integration	.29	Construction and use of knowledge	.23	.03	.26
		Deep processing	.14	.03	.15
		Vocation-oriented	.07	.02	.10
		Stimulating education	.07	.02	.10
		Keeping a good state of mind	.07	.02	.08
		Cooperative learning	.05	.02	.07
Student autonomy	.08	Vocation-oriented	.09	.02	.12
		Problems with motivation & concentration	.08	.02	.12
		Certificate-oriented	.15	.03	.15
		Intake of knowledge	-.10	.03	-.13
		Cooperative learning	.08	.02	.11
		Fear of failure	-.07	.03	-.08
Interaction	.35	Cooperative learning	.34	.02	.50

		Construction and use of knowledge	.11	.03	.12
		Vocation-oriented	.07	.02	.10
		Stepwise processing	.07	.02	.08
Differentiation	.13	Intake of knowledge	-.24	.03	-.21
		Stepwise processing	-.18	.04	-.15
		Construction and use of knowledge	.14	.04	.11
		Vocation-oriented	-.09	.03	-.08
Clarity of goals	.10	Certificate-oriented	.18	.03	.18
		External regulation	.11	.03	.13
		Construction and use of knowledge	.09	.03	.11
Personalisation	.14	Construction and use of knowledge	.16	.03	.17
		Certificate-oriented	.13	.03	.13
		Stimulating education	.08	.02	.10
		Keeping a good state of mind	.10	.03	.11
		Cooperative learning	.06	.02	.09

Figure captions

Figure 1. Mean scores and standard deviations of the perceived and desired learning environment.


Perception
Desire
Mean
6
5
4
3
2
1
Fascinating contents
Productive learning
Integration
Student autonomy
Interactive learning
Differentiation
Clarity of goals
Personalisation
Scale